

2014

# DOCTORATE RECIPIENTS FROM U.S. UNIVERSITIES

NATIONAL CENTER FOR SCIENCE AND ENGINEERING STATISTICS  
DIRECTORATE FOR SOCIAL, BEHAVIORAL AND ECONOMIC SCIENCES



*SED*  
Survey of Earned Doctorates

DECEMBER 2015

NATIONAL SCIENCE FOUNDATION



## ABOUT THIS REPORT

**T**he Survey of Earned Doctorates, the data source for this report, is an annual census of individuals who receive research doctoral degrees from accredited U.S. academic institutions. The survey is sponsored by six federal agencies: the National Aeronautics and Space Administration, National Endowment for the Humanities, National Institutes of Health, National Science Foundation (NSF), U.S. Department of Agriculture, and U.S. Department of Education. These data are reported in several publications from NSF's National Center for Science and Engineering Statistics. The most comprehensive and widely cited publication is this report, Doctorate Recipients from U.S. Universities.

This report calls attention to important trends in doctoral education, organized into themes highlighting important questions about doctorate recipients. Online, the reader is invited to explore trends in greater depth through detailed data tables and interactive graphics ([www.nsf.gov/statistics/sed/](http://www.nsf.gov/statistics/sed/)). Technical notes and other online resources are provided to aid in interpreting the data. The data tables are available as PDF and Excel files for easy viewing, printing, and downloading.

# DOCTORATE RECIPIENTS FROM U.S. UNIVERSITIES 2014



National Center for Science and Engineering Statistics  
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## WHY IS THIS IMPORTANT?

**T**he American system of doctoral education is widely considered to be among the world's best, as evidenced by the large and growing number of international students each year—many of them among the top students in their countries—who choose to pursue the doctoral degree at U.S. universities. But the continued preeminence of U.S. doctoral education is not assured. Other nations, recognizing the contributions doctorate recipients make to economies and cultures, are investing heavily in doctoral education. Unless doctoral education in the United States continues to improve, the world's brightest students, including U.S. citizens, may go elsewhere for the doctoral degree, and they may begin careers elsewhere as well.

Annual counts of doctorate recipients are measures of the incremental investment in human resources devoted to science, engineering, research, and scholarship, and they can serve as leading indicators of the capacity for knowledge-creation and innovation in various domains. The changing characteristics of this population over time—including the increased representation of women, minorities, and foreign nationals; emergence of new fields of study; time it takes to complete doctoral study; expansion of the postdoctoral pool; and reduced academic employment opportunities after graduation—reflect political, economic, social, technological, and demographic trends and events. Understanding the connections between these larger forces and the number and characteristics of doctorate recipients is necessary to make informed improvements in this country's doctoral education system.

Doctorate recipients begin careers in large and small organizations, teach in universities, and start new businesses. Doctoral education develops human resources that are critical to a nation's progress—scientists, engineers, researchers, and scholars who create and share new knowledge and new ways of thinking that lead, directly and indirectly, to innovative products, services, and works of art. In doing so, doctorate recipients contribute to a nation's economic growth, cultural development, and rising standard of living.



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## WHO EARNS A U.S. DOCTORATE?

Each new cohort of doctorate recipients augments the supply of prospective scientists, engineers, researchers, and scholars. Data on the changing demographic composition of these cohorts reveal increasing diversity from traditionally underutilized groups.

### OVERALL TRENDS

The 54,070 research doctorate degrees awarded by U.S. institutions in 2014 represent the highest number ever reported by the Survey of Earned Doctorates (SED). The number of doctorates awarded each year shows a strong upward trend over time—average annual growth of 3.4%—punctuated by brief periods of slow growth and even decline.

In every year of the SED, the number of doctorates awarded in science and engineering (S&E) fields has exceeded the number of non-S&E doctorates. The gap between the annual counts of S&E and non-S&E doctorates has widened over the past 40 years, with the proportion of S&E doctorates rising from 58% in 1974 to 75% in 2014. The number of non-S&E doctorates awarded in 2014 declined 2.4% from the 2013 total, the fifth single-year decline over the past 10 years (figure A).

### CITIZENSHIP

The number of doctorates in S&E fields awarded to temporary visa holders grew to 13,739 in 2014, a 45% increase since 2004 and a 2% increase since 2013. The number of S&E doctorates awarded to U.S. citizens and permanent residents also grew in 2014 at a comparable rate—a 42% increase since 2004 and 2% growth since 2013.

In 1994, 29% of all S&E doctorates were awarded to temporary visa holders. The proportion of S&E doctorate recipients holding temporary visas increased to 41% by 2007 but has since fallen to 37% in 2014.

Over the period 2004 to 2014, 85% of the doctorates earned by temporary visa holders were in S&E fields, compared with 66% of the doctorates earned by U.S. citizens and permanent residents (figure B).

### COUNTRIES OR ECONOMIES OF FOREIGN CITIZENSHIP

Ten countries accounted for 70% of the doctorates awarded to temporary visa holders from 2004 to 2014, and the top three—China, India, and South Korea—accounted for more than half (figure C).

### SEX

#### Citizenship

Women are becoming increasingly prevalent in each new cohort of doctorate recipients, earning a majority of all doctorates awarded to U.S. citizens and permanent residents each year since 2002 and earning one-third of all doctorates awarded to temporary visa holders over that period. Overall, women earned 46% of all doctorates in 2014. The total number of doctorate recipients increased for both men and women every year since 2010 (figure D).

#### Field of study

The growth in number of S&E doctorates awarded to women over the past 20 years has exceeded the growth in male S&E doctorates by a substantial margin. In 2014, the number of S&E doctorates awarded to men reached 23,298, an increase of 26% (nearly 5,000 more doctorates) over the 1994 total. The number of female S&E doctorates nearly doubled over the period, increasing by more than 8,500 doctorates from 1994 to 2014. Although women's share of S&E doctorates awarded increased from 32% in 1994 to 42% in 2009, this proportion has changed little since then.

In non-S&E fields, the number of female doctorate recipients has grown at a slower pace (7%) over the past 20 years while the number of male doctorates in those fields has declined by 13%. Women's share of non-S&E doctorates increased from 52% in 1994 to 57% in 2002, and has remained near this rate since that year (figure E).

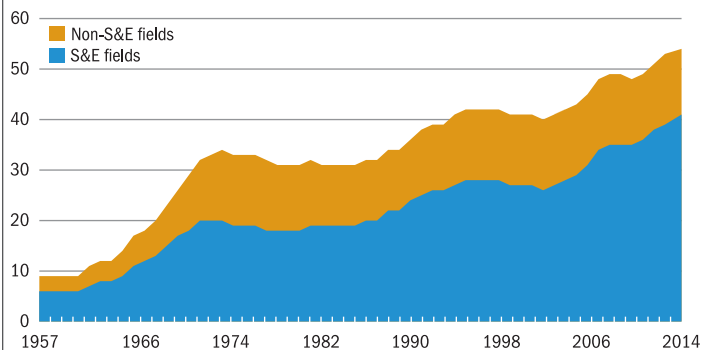
### RACE AND ETHNICITY

Participation in doctoral education by underrepresented minority groups who are U.S. citizens or permanent residents is increasing, as evidenced by a 70% increase in the number of doctorates awarded to blacks or African Americans over the past 20 years and a more than doubling in the number of Hispanic or Latino doctorate recipients. Owing to these growth rates, the proportion of doctorates awarded to blacks or African Americans has risen from 4.1% in 1994 to 6.4% in 2014, and the proportion awarded to Hispanics or Latinos has risen from 3.3% in 1994 to 6.5% in 2014 (figure F).

A

### Doctorates awarded by U.S. colleges and universities: 1957–2014

Doctorate recipients (thousands)

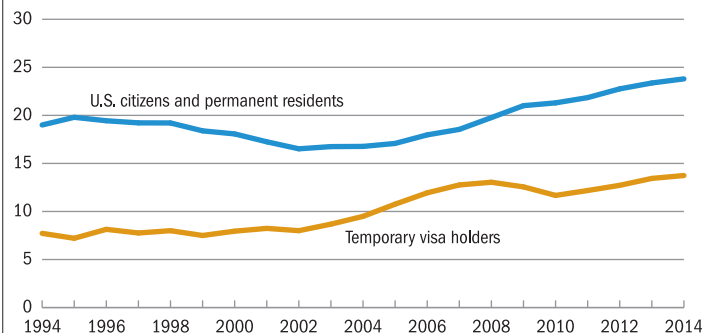


SOURCE: *Doctorate Recipients from U.S. Universities 2014*.

B

### Doctorates awarded in science and engineering fields, by citizenship: 1994–2014

S&E doctorate recipients (thousands)

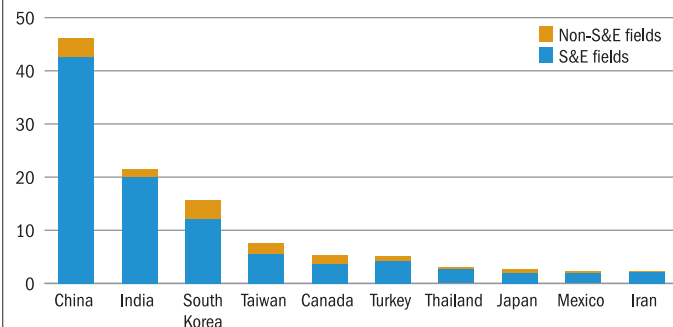


SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 17, 18.

C

### Top 10 countries or economies of foreign citizenship for U.S. doctorate recipients: Total, 2004–14

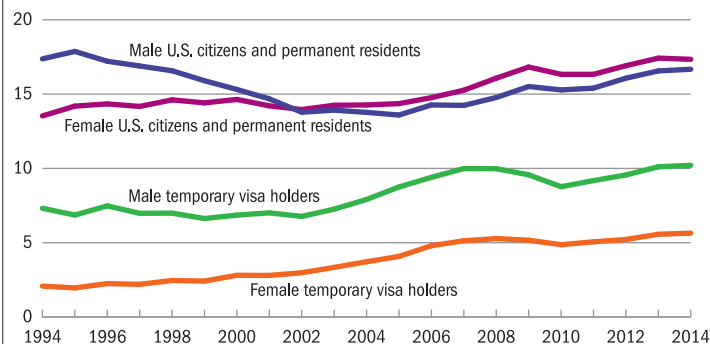
Doctorate recipients (thousands)



SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 25, 26.

### Sex and citizenship of U.S. doctorate recipients: 1994–2014

Doctorate recipients (thousands)

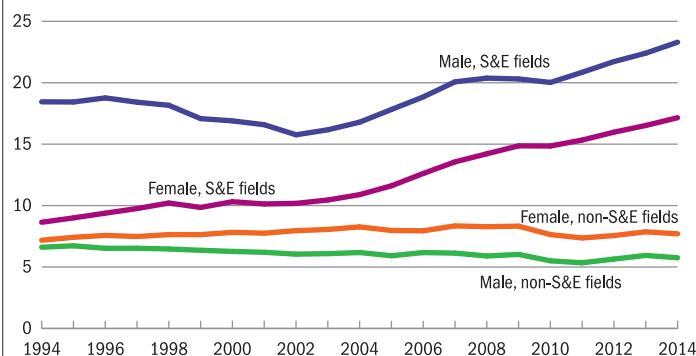


SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 20, 21.

D

### Sex and field of study of U.S. doctorate recipients: 1994–2014

Doctorate recipients (thousands)

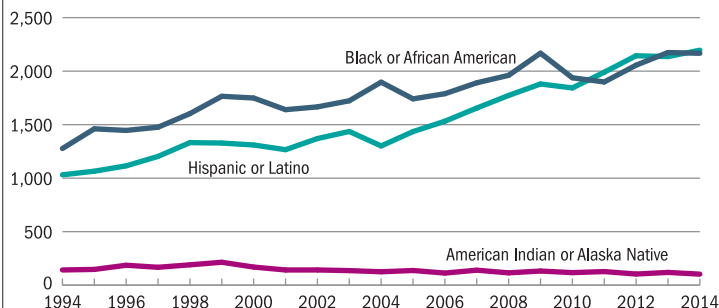


SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 14, 15, 16.

E

### Doctorates earned by members of U.S. underrepresented minorities: 1994–2014

Doctorate recipients



SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 19, 22, 23, 24.

F



## WHICH FIELDS ATTRACT STUDENTS?

As researchers expand their understanding of the world, new fields of study emerge and existing fields change. Observing which fields of study are attracting growing proportions of students can provide early insight into where future research breakthroughs may occur.

### FIELD TRENDS

#### Science and engineering

Doctorates in science and engineering (S&E) fields, particularly in life sciences, represent a growing share of all doctorates awarded. S&E doctorates accounted for 75% of all doctorates awarded in 2014, a substantially larger share than 10 years earlier (66%). The relative share of doctorates awarded in life sciences, physical sciences, and engineering increased over the past decade. Despite a 23% increase in the absolute number of social sciences doctorates awarded from 2004 to 2014, the relative share of these doctorates declined over the period (figure A).

#### Non-science and engineering

The number of doctorates awarded in education has declined over the past decade, leading to a large, steady drop in the relative share of doctorates in this field from 16% in 2004 to 9% in 2014. (From 2010 to 2011, the SED reclassified 143 EdD degree programs. See “Data Source” for more information.) Despite an increase in the number of humanities doctorates, the relative share of doctorates awarded in this field fell 2 percentage points from 2004 to 2014. The share of doctorates in other non-S&E fields has remained fairly stable over the past decade (figure B).

### TEMPORARY VISA HOLDERS

In every broad field of study, the share of doctorates awarded to temporary visa holders is larger in 2014 than it was 20 years earlier. Temporary visa holders are most prevalent in engineering and physical sciences. In 2014, temporary visa holders represented 55% of doctorate recipients in engineering and 45% of those in the physical sciences (figure C).

### MINORITY U.S. CITIZENS AND PERMANENT RESIDENTS

Among minority U.S. citizens and permanent residents, doctorate recipients of different racial or ethnic backgrounds are more heavily represented in some fields of study than in others. In 2014, Asians were the largest U.S. minority population in life sciences, physical sciences, and engineering; blacks or African Americans were the largest U.S. minority population in education and other non-S&E fields; and Hispanics or Latinos earned more doctorates in humanities than did any other minority group. In 2014, Asians, Hispanics or Latinos, and blacks or African Americans earned relatively similar proportions of doctorates in social sciences (figure D).

### WOMEN

#### Field of study

Women's share of doctorates awarded has grown over the past two decades in all broad fields of study. The largest increase in the representation of women occurred in life sciences, where the share of female doctorate recipients increased by 14 percentage points from 1994 to 2014. The smallest increase in the proportion of female doctorates was reported in humanities, with an increase of 4 percentage points over the 20 years. Although women earned only 23% of the 2014 engineering doctorates, this represented a large advance (12 percentage points) over 1994 (figure E).

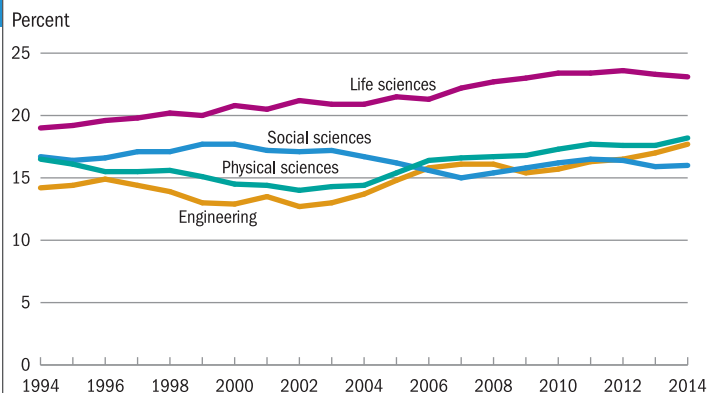
#### Growing fields

The fastest growing subfields of doctoral study for women over the past decade have been within the physical sciences (led by computer and information sciences) and engineering (led by materials science engineering) (figure F).



A

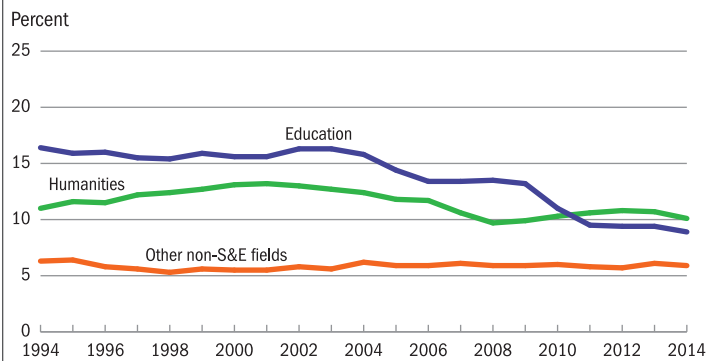
### Doctorates awarded in science and engineering fields of study: 1994–2014



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 4, 7, 12, 13.

B

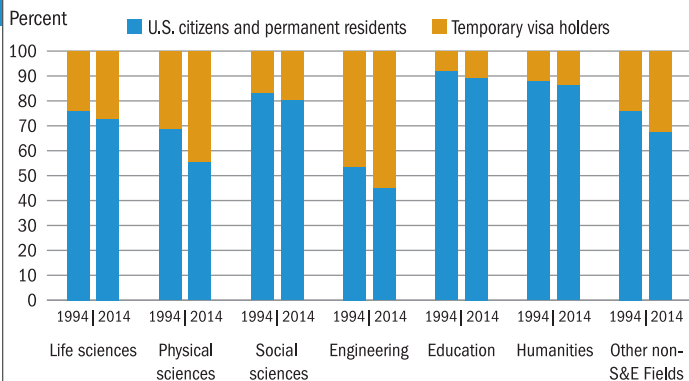
### Doctorates awarded in non-science and engineering fields of study: 1994–2014



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 4, 8, 12, 13.

C

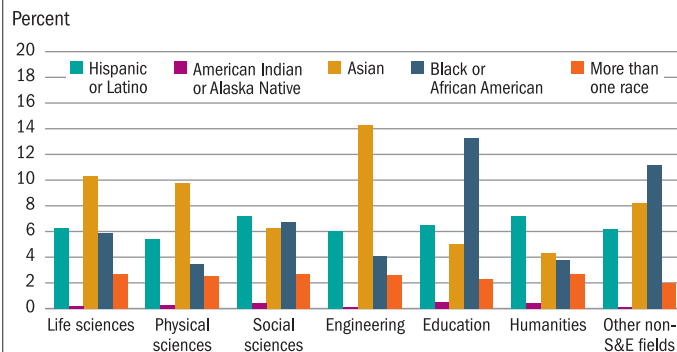
### Doctorates awarded, by citizenship and field of study: 1994 and 2014



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: table 17.

D

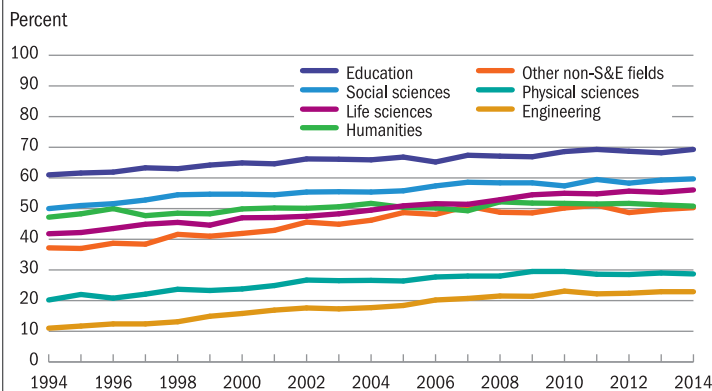
### Doctorates awarded to minority U.S. citizens and permanent residents, by ethnicity, race, and field of study: 2014



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 23, 24.

E

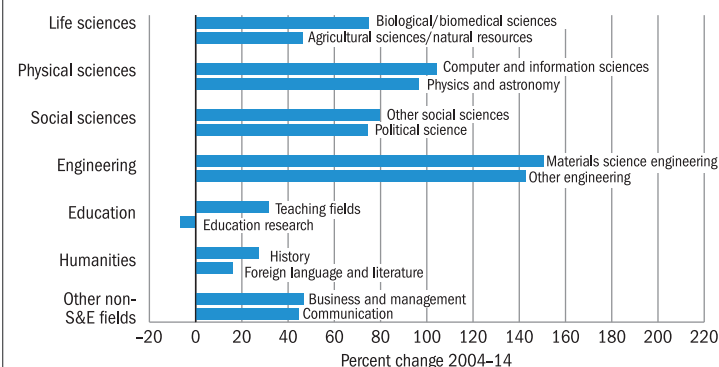
### Doctorates awarded to women, by field of study: 1994–2014



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 14, 15, 16.

F

### Top fields of study for female doctorate recipients, by broad field and select subfield: 2004–14



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: table 15.



## WHAT INFLUENCES THE PATH TO THE DOCTORATE?

Some paths to the doctoral degree are less traveled and some are more difficult to navigate, owing to a variety of influences that shape doctoral study. These paths may lead to different postgraduate destinations.

### PARENTAL EDUCATION

#### Overview

The parents of recent doctorate recipients are better educated than the parents of earlier cohorts of doctorate recipients. The share of doctorate recipients from families in which neither parent has earned more than a high school degree is declining, and the proportion of families in which at least one parent has earned a bachelor's degree or higher continues to climb, rising from 55% of doctorate recipients in 1994 to 69% in 2014 (figure A).

#### By race and ethnicity

The pattern of rising parental educational attainment is visible among all races and ethnicities for U.S. citizen or permanent resident doctorate recipients. Nonetheless, doctorate recipients from underrepresented minority groups are less likely to have at least one parent with a bachelor's degree than are Asian or white doctorate recipients.

As of 2014, approximately half of American Indian or Alaska Native and black or African American, and more than 40% of Hispanic or Latino doctorate recipients, belonged to families in which neither parent had been awarded a college degree. In comparison, roughly three-fourths of Asian doctorate recipients and white doctorate recipients came from families with at least one college-educated parent, and half had at least one parent who had earned an advanced degree (figure B).

### SOURCES OF FINANCIAL SUPPORT

#### Overview

Research assistantships and teaching assistantships are the most important sources of financial support for a growing proportion of doctoral students. Compared with years past, fewer doctoral students now rely primarily on their own resources—loans, personal savings, personal earnings, and the earnings or savings of their spouse, partner, or family—to finance their doctoral studies. The proportion of doctoral students relying on fellowships or grants as their most important source of financial support has remained relatively stable since 2004 (figure C).

#### By field of study

In 2014, fellowships or grants were the most common primary source of support for doctoral students in life sciences. Research assistantships were the dominant source of support in physical sciences and in engineering, and teaching assistantships were the most common source for doctoral students in humanities. In other non-science and engineering (non-S&E) fields and in the social sciences, similar proportions of doctorate recipients reported fellowships or grants, teaching assistantships, and their own resources as their primary source of financial support. Doctoral students in education fields were the most likely to rely on their own resources, with nearly half reporting this as their primary source of support (figure D).

### EDUCATION-RELATED DEBT

The amount of education-related debt incurred by doctorate recipients during graduate school is an indicator of the availability of financial support. In 2014, more than two-thirds of doctorate recipients in life sciences and more than three-quarters of those in physical sciences and engineering reported no debt related to their graduate education when they were awarded the doctorate. In social sciences, humanities, education, and other non-S&E fields, that proportion dropped to approximately one-half.

Within each broad field of study, 7% to 9% of doctorate recipients had incurred education-related debt of \$10,000 or less by the time they graduated. The shares of doctoral graduates with education-related debt burdens over \$30,000 were greatest in the social sciences (34%), education (37%), humanities (29%), and other non-S&E fields (31%) (figure E).

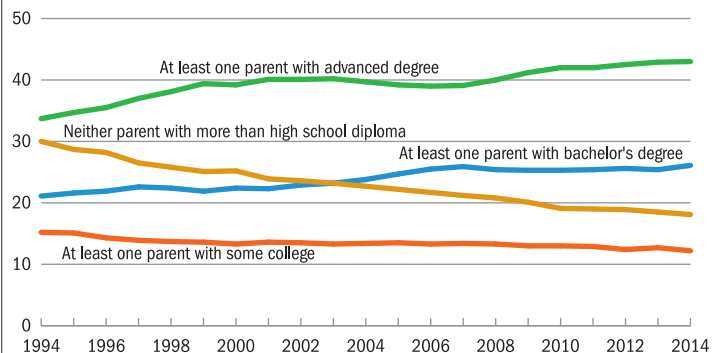
### TIME TO DEGREE

The time between entering graduate school and earning the doctorate has declined in all fields of study over the past 20 years, particularly in education. Since 2006, there has been little change in the duration of study of doctorate recipients in S&E fields, and there have been continued declines in the duration of study of non-S&E doctorates. Despite these trends, it still takes years longer to earn a doctorate in non-S&E fields than it does to complete doctoral training in S&E fields (figure F).

A

### Highest parental educational attainment: 1994–2014

Percent doctorate recipients

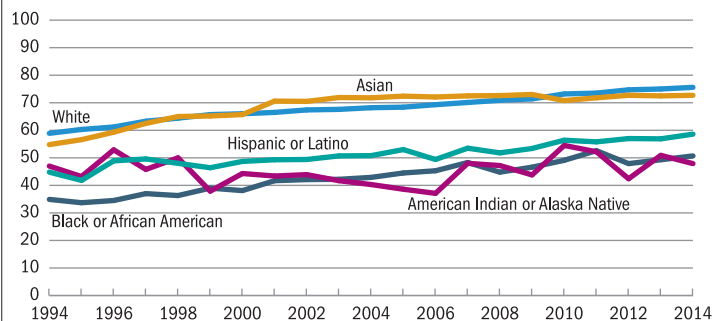


SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 33, 34.

B

### Parental educational attainment of U.S. citizen or permanent resident doctorate recipients, by ethnicity and race: 1994–2014

Percent having at least one parent with a bachelor's degree or higher

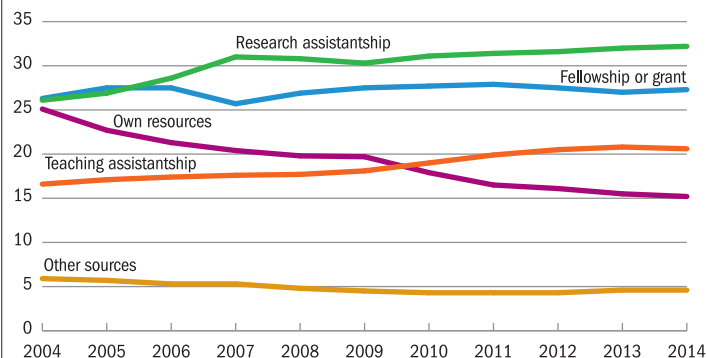


SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 33, 34.

C

### Primary source of financial support: 2004–14

Percent

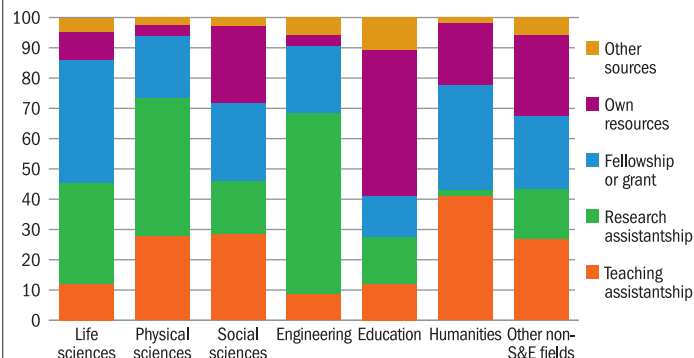


SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: table 35.

D

### Primary source of financial support, by field of study: 2014

Percent

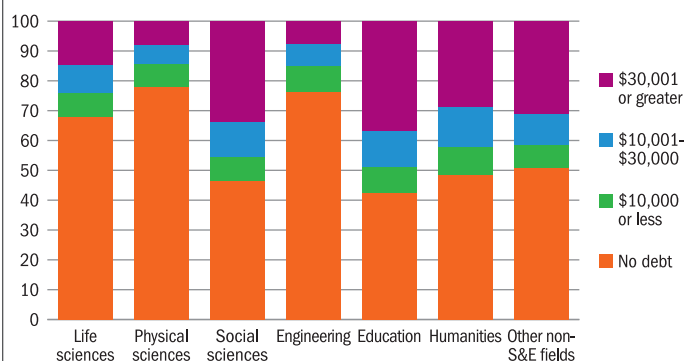


SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 35, 36, 37.

E

### Graduate education-related debt, by field of study: 2014

Percent

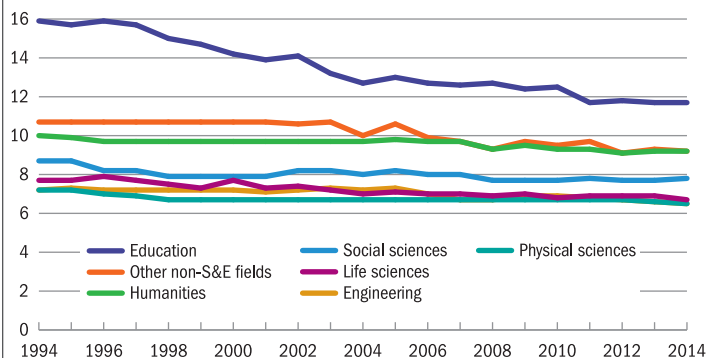


SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 38, 39, 40.

F

### Median time to degree, by fields of study: 1994–2014

Years (graduate school entry to doctorate)



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 31, 32.



## WHAT ARE THE POSTGRADUATION TRENDS?

A graduate's first position after earning the doctoral degree may reflect broad economic conditions and can shape later career opportunities and choices. Over the longer term, the early career patterns of doctorate recipients may influence the decisions of future generations of students considering careers as scientists, engineers, scholars, and researchers.

### JOB MARKET

#### Science and engineering

At any given time, the job market will be better for new doctorate recipients in some fields of study than in others.

In every broad science and engineering (S&E) field, the proportion of 2014 doctorate recipients who reported definite commitments for employment or a postdoc position was at or near the lowest level of the past 15 years (figure A).

#### Non-science and engineering

The proportion of doctorate recipients with definite commitments for employment or postdoc study declined in 2014 for the fifth time in the past 6 years in every broad non-S&E field of study. The share of doctorate recipients with definite commitments reached 20-year low points in each of these non-S&E fields (figure B).

### FIRST POSTGRADUATE POSITION

#### Academic employment

In 2014, nearly half of all doctorate recipients with definite commitments for employment in the United States (excluding those with commitments for postdoc positions) reported that their principal job would be in academe.

The highest rates of academic employment are reported by doctorate recipients in humanities and other non-S&E fields (near 80%); the lowest rates are reported by engineering (15%) and physical sciences (29%) doctorates. Over the past 10 years, the rate of academic employment has declined by more than five percentage points in life sciences, physical sciences, and engineering, whereas the academic employment rate of doctorates in education and other non-S&E fields has increased (figure C).

#### Postdoc positions

Historically, postdoc positions have been a customary part of the early career paths of doctoral scientists in the life sciences and physical sciences; such positions are also becoming increasingly prevalent in engineering

and social sciences. However, the proportion of doctorate recipients taking postdoc positions in the United States declined in 2014 in physical sciences and engineering, and the proportion increased only slightly in life sciences and non-S&E fields. The proportion of doctorate recipients accepting U.S. postdoc positions has increased more sharply in social sciences than in other fields over the past decade, climbing from 31% in 2004 to 37% in 2014 (figure D).

### MEDIAN SALARIES

In 2014, doctorate recipients who had definite commitments for a postdoc or other employed position in the United States in the coming year reported annual salaries ranging from \$40,000 to \$105,000, depending on their field of study and the type of position to which they committed.

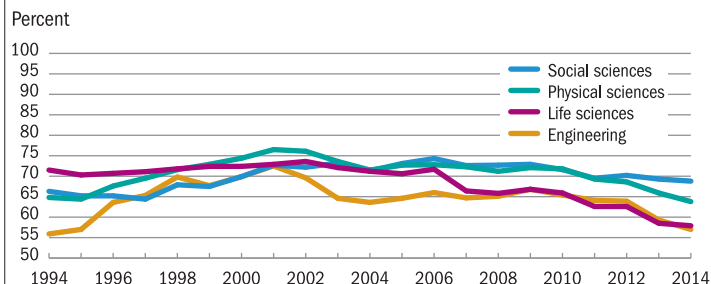
In 2014, doctorate recipients who took postdoc positions reported similar salaries (ranging between \$40,000 and \$49,000) regardless of their field of study. In all broad fields, postdoc salaries were lower than salaries reported by doctorate recipients entering non-postdoc employment in industry or academe. Academic salaries lagged behind industry salaries in all broad fields except humanities (figure E).

### POSTGRADUATION LOCATION

Over the past 20 years, temporary visa holders earning doctorates have been increasingly likely to stay in the United States immediately following graduation, a measure referred to as the stay rate. In 1994, more than half of doctorate recipients holding temporary visas reported definite postgraduation commitments for a postdoc or other employment in the United States; by 2014, the stay rate had risen to three-fourths. Stay rates are highest in fields where temporary visa holders are most prevalent: engineering, physical sciences, and life sciences. Over the past 20 years, the stay rates for doctorate recipients in non-S&E fields and in social sciences have been similar and have remained approximately 20 percentage points below the stay rates of graduates in engineering, physical sciences, and life sciences (figure F).

A

### Definite commitments at doctorate award, by science and engineering fields of study: 1994–2014

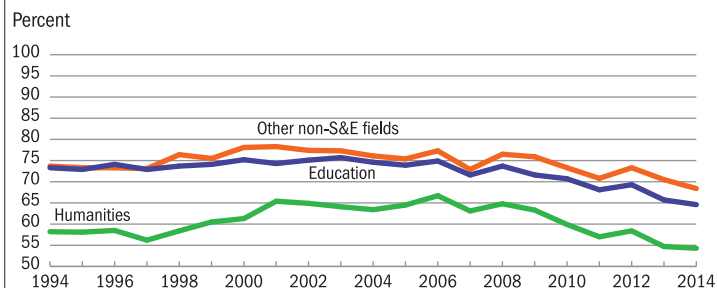


NOTE: Definite commitment refers to a doctorate recipient who is either returning to predoctoral employment or has signed a contract (or otherwise made a definite commitment) for employment or a postdoc position in the coming year.

SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 42, 43.

B

### Definite commitments at doctorate award, by non-science and engineering fields of study: 1994–2014

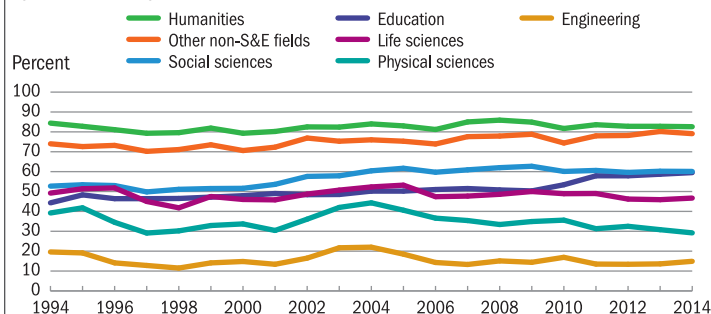


NOTE: Definite commitment refers to a doctorate recipient who is either returning to predoctoral employment or has signed a contract (or otherwise made a definite commitment) for employment or a postdoc position in the coming year.

SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 42, 43.

C

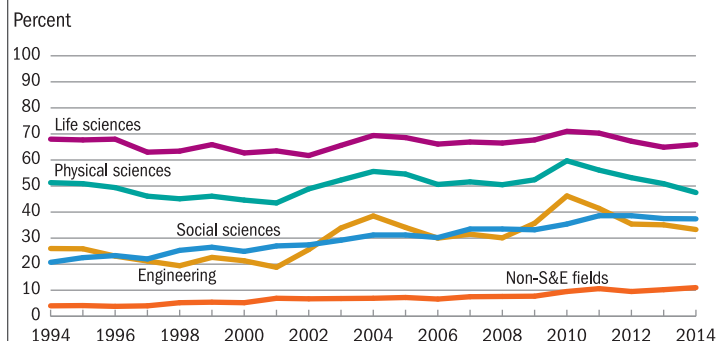
### Definite commitments for academic employment in the United States, by field of study: 1994–2014



NOTE: Percentages are based on those with both definite commitments for employment in the coming year (including those missing employer type) and plans to stay in the United States.

SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 44, 51, 52.

### U.S. postdoc rate, by field of study: 1994–2014

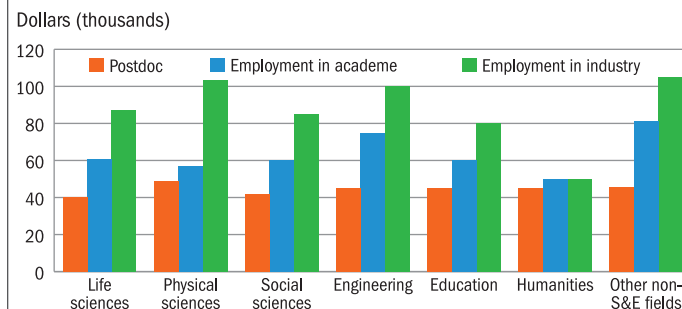


NOTE: Percentages are based on the number of doctorate recipients who reported definite postgraduation commitments for a postdoc or other employment and plans to stay in the United States.

SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 44, 51, 52.

D

### Median basic salary of doctorate recipients with definite commitments in the United States, by position type and field of study: 2014



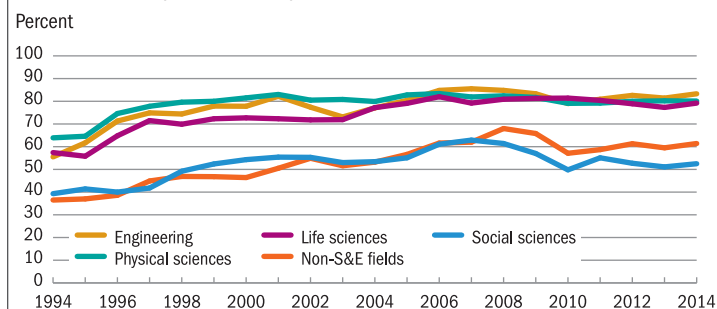
NOTES: Other non-S&E fields includes business management and administration.

Employment in industry includes doctorate recipients who indicated self-employment.

SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 48, 49.

E

### Stay rate of temporary visa holders with definite commitments in the United States, by field of study: 1994–2014



NOTE: Percentages are based on temporary visa holders who reported definite postgraduation commitments for a postdoc or other employment.

SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 51, 52, 53.

F





# FIRST-GENERATION COLLEGE STUDENTS WHO GO ON TO EARN A DOCTORATE: WHAT ARE THE OVERALL TRENDS?

**D**octorate holders who are first-generation college students are those for whom neither parent earned a bachelor's degree. This group differs from other doctorate recipients on a number of characteristics and education choices.

## OVERALL COUNTS AND TRENDS

The number of first-generation college students who later received a doctorate peaked at 19,060 in 1973. Doctorates awarded to this group declined at an average rate of nearly 2% per year from 1973 to 1987; despite short periods of growth and decline there has been no discernible trend since 1987. The number of doctorate recipients for whom at least one parent earned a college degree (second- or later-generation college students) grew at an average rate of almost 2% annually from 1973 to 1987 and grew at an even faster annual rate (3%) after 1987. As a result of these differential rates of growth, the proportion of doctorate recipients who were first-generation college students has fallen from more than two-thirds in 1963 to less than one-third in 2014 (figure A).

## FIELDS OF STUDY

In 1994, compared with doctorate recipients who were second- or later-generation college graduates, doctorate recipients who were first-generation college graduates were more likely to earn their degree in education (22% versus 11%) and were less likely to choose an S&E field of study (62% versus 71%).

Twenty years later, the field of study choices between the two groups became more similar. Education was only the fifth most common field of study in 2014 for doctorate recipients who were first-generation college graduates, and the percentage of doctorate recipients who were first-generation graduates choosing an S&E field for their doctoral studies (74%) nearly matched the share of other doctorate holders earning an S&E doctorate that year (76%) (figure B).

## CHARACTERISTICS OF DOCTORATE RECIPIENTS

### Citizenship and sex

From 1994 to 2014, the share of first-generation college students with a doctorate remained between 7 and 11 percentage points greater among temporary visa holders than among U.S. citizens and permanent residents. The proportion of first-generation college students with a doctorate declined steadily over the 20 years in both citizenship categories.

These citizenship trends differ for men and women. Among temporary visa holders, male doctorate recipients are more likely than their female counterparts to be first-generation college students. The reverse is true among the U.S. citizen and permanent resident category. Also, while the share of first-generation graduates among female temporary visa holders has remained nearly stable since 2002, the shares of first-generation graduates among the other three citizenship-sex categories continued to decline from 2002 to 2014 (figure C).

### Ethnicity and race

Among doctorate recipients reporting U.S. citizenship or permanent residency status, black or African American doctorate holders and Hispanic or Latino doctorate recipients are more likely to be first-generation college students than are Asian or white doctorate recipients. The share of doctorate holders who were first-generation college students declined gradually from 1994 to 2014 for all ethnic and racial groups except American Indian or Alaska Native doctorate recipients (figure D).

### Doctoral institutions

The two generation groups differ in the types of institutions they choose for their doctoral studies. Doctorate recipients who were first-generation college students are less likely than other doctorate recipients to earn their doctoral degree from the most research-intensive universities. In the selected years 1994, 2004, and 2014, between 77% and 80% of second- or later-generation college students with doctorates received their doctorates from very high research universities, but only 66% to 70% of doctorate recipients who were first-generation doctorate college students did so (figure E).

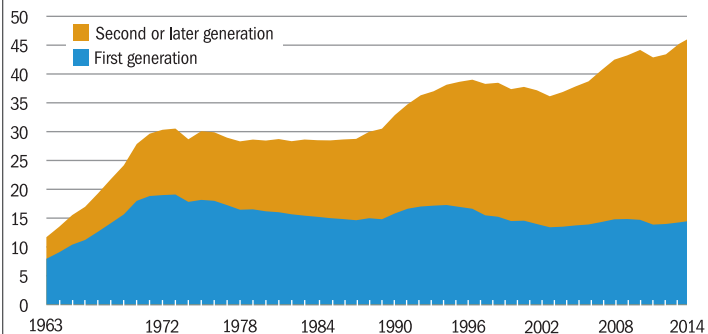
### Baccalaureate-origin institutions

The two generation groups also differ with respect to the types of institutions from which they earn bachelor's degrees. Considering only doctorate recipients with bachelor's degrees from U.S. institutions, approximately one-third of first-generation college students earned bachelor's degrees from very high research universities in the selected years 1994, 2004, and 2014, whereas nearly one-half of second- or later-generation college students did so (figure F).

A

### Doctorates awarded, by college generation: 1963–2014

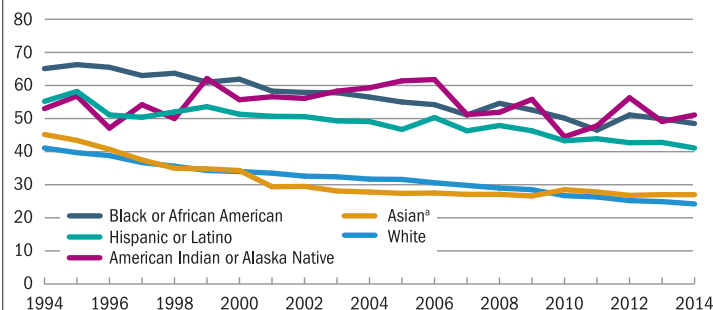
Doctorate recipients (thousands)



SOURCE: Doctorate Recipients from U.S. Universities 2014.

### U.S. citizen or permanent resident doctorate recipients who were first-generation college graduates, by ethnicity and race: 1994–2014

Percent

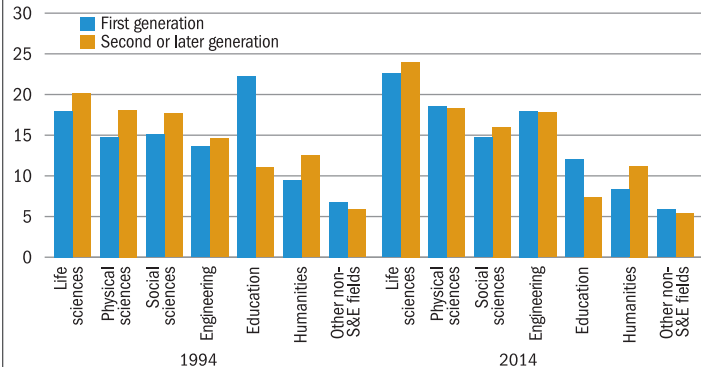


\* Includes Native Hawaiians or Other Pacific Islanders through 2000, but excludes them from 2001–14. SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 19, 23.

B

### Doctorates awarded, by college generation and field of study: 1994 and 2014

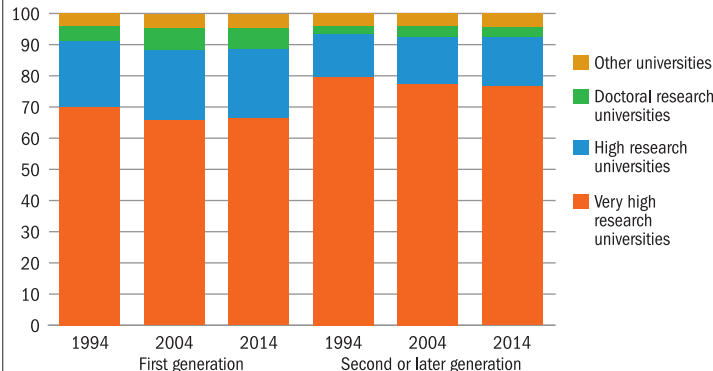
Percent



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 11, 12, 33.

### Doctoral institution type, by college generation: 1994, 2004, 2014

Percent

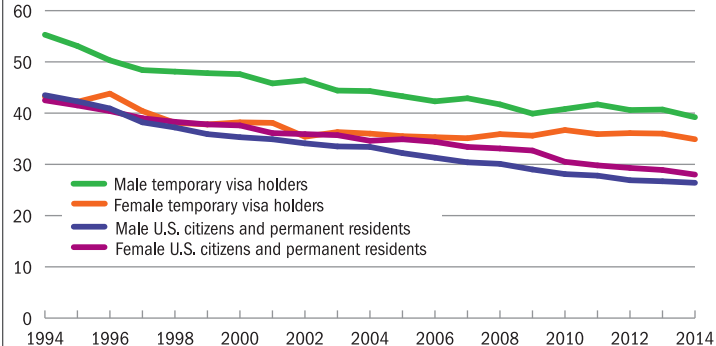


SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: table 11.

C

### Doctorate recipients who were first-generation college graduates, by citizenship and sex: 1994–2014

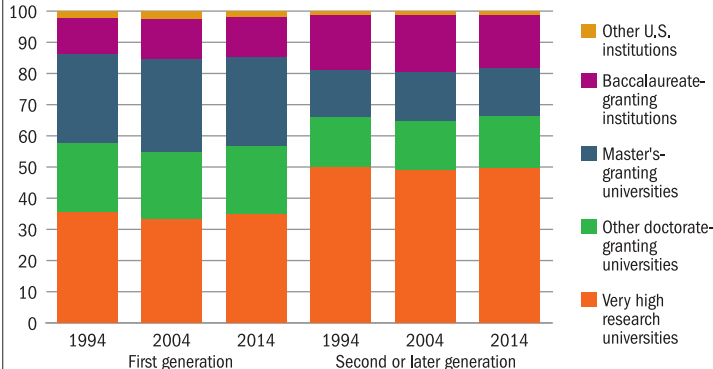
Percent



SOURCE: Doctorate Recipients from U.S. Universities 2014. Related detailed data: tables 20, 21.

### U.S. baccalaureate-origin institutions, by college generation: 1994, 2004, 2014

Percent



SOURCE: Doctorate Recipients from U.S. Universities 2014.



## FIRST-GENERATION COLLEGE STUDENTS WHO GO ON TO EARN A DOCTORATE: WHAT ARE THE EDUCATIONAL EXPENSES AND EMPLOYMENT OUTCOMES?

**D**octorate recipients who were first-generation college students differ from other doctorate recipients with respect to the duration and expense of their doctoral training and, to a lesser degree, their initial postgraduate employment outcomes.

### TIME TO DEGREE

From 2010 to 2014, first-generation college students who went on to earn a doctorate took longer than other doctorate recipients to complete their degree. This result held for every broad field of study. For both generation groups, those earning doctorates in education had the longest median time to degree, while doctorate recipients in life sciences, physical sciences, and engineering took the least time to complete their degree (figure A).

### EDUCATION-RELATED DEBT

#### **Graduates with debt**

From 1994 to 2014, roughly one-half of all doctorate recipients graduated with outstanding debt incurred during their undergraduate and graduate education. The shares of doctorate recipients with cumulative education-related debt were similar for first-generation college students who went on to earn a doctorate and other doctorate recipients up to 1998 but gradually diverged after that time. In 2014 first-generation college students who went on to earn a doctorate were more likely than other doctorate holders to have outstanding debt at the time of graduation (53% versus 46%) (figure B).

#### **Level of graduate debt**

In 2014, doctorate holders who were first-generation college students were more likely than second- or later-generation doctorate recipients to hold a high level of debt specifically related to their graduate education. Overall, 24% of doctorate holders who were first-generation college students but only 17% of other doctorate holders reported graduate education-related debt in excess of \$30,000 at the time of doctorate award. The greater tendency of doctorate holders who were first-generation college students to graduate with high debt loads was evident among graduates of each type of doctoral institution and among graduates with doctorates in S&E fields as well as non-S&E fields. Both generation groups of doctorate recipients from doctoral research universities were more likely to incur high levels of debt during graduate school than were graduates from very high research and high research universities (figure C).

### FIRST POSTGRADUATE POSITION

#### **Employment sector**

For selected years 1994, 2004, and 2014, academe was the most common sector of employment for doctorate recipients reporting definite commitments for non-postdoc employment in the United States, with approximately half of doctoral graduates from both generation groups committing to academic positions after graduation. Across the two decades, doctorate holders who were first-generation college students were more likely than other doctorate recipients to take positions in the education sector (includes primary and secondary schools and school systems), whereas the industry sector was more popular among doctorate holders who were second- or later-generation college students. However, these differences had become quite modest by 2014. The share of graduates from each generation group taking positions in industry increased substantially from 2004 to 2014 (figure D).

#### **Postdocs**

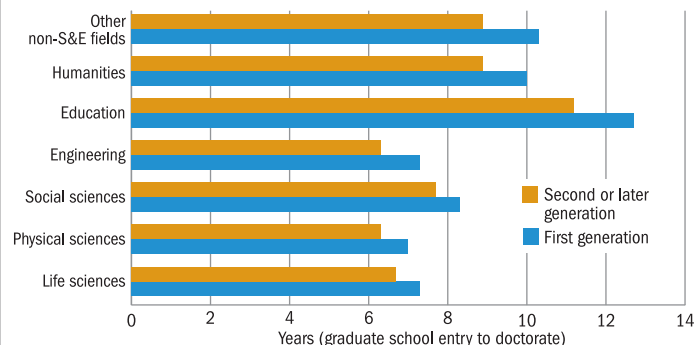
Among doctorate recipients reporting definite commitments for postdoc or employed positions in the United States from 2010 to 2014, doctorate holders who were first-generation college students were less likely than other doctorate holders to take postdoc positions (49% versus 53%). Both groups of doctorate recipients graduating from very high research and high research universities had similar postdoc rates. Doctorate recipients from medical schools and centers were far more likely than graduates of other types of institutions to take a U.S. postdoc position, whereas doctorate recipients from doctoral research universities were least likely to do so (figure E).

#### **Median salaries**

In 2014, median salaries for doctorate recipients with definite commitments in the United States were nearly identical for first-generation college students who went on to earn a doctorate and for other doctorate recipients across different types of positions. The median salaries of the two groups of doctorate recipients were the same for employed positions in academe and industry (figure F).

A

### Median time-to-degree, by college generation and field of study: 2010–14

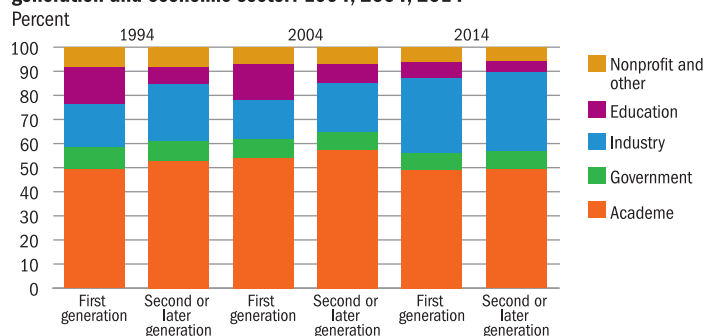


NOTE: Time-to-degree is total time elapsed from graduate entry to doctorate.

SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 31, 32.

D

### Definite commitments for employment in the United States, by college generation and economic sector: 1994, 2004, 2014

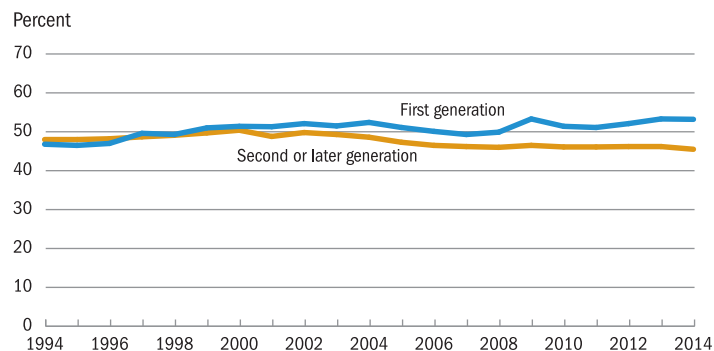


NOTE: Definite commitment refers to a doctorate recipient who is either returning to predoctoral employment or has signed a contract (or otherwise made a definite commitment) for employment or a postdoc position in the coming year.

SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 46, 47.

B

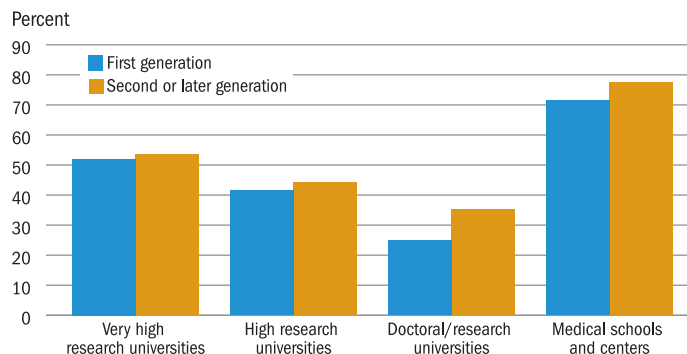
### Doctorate recipients with cumulative education-related debt, by college generation: 1994–2014



SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 37, 38, 39, 40.

E

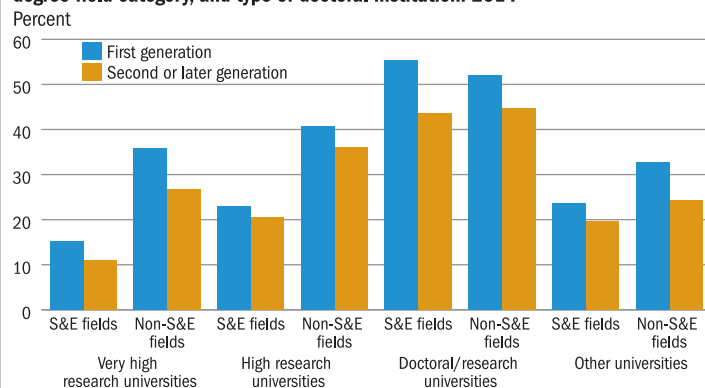
### Postdoc rate among S&E doctorate recipients in the United States, by college generation and type of doctoral institution: 2010–14



SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 44, 51, 52.

C

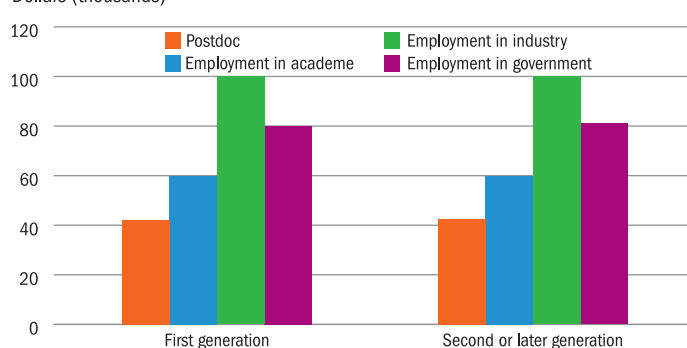
### Graduate education-related debt greater than \$30,000, by college generation, degree field category, and type of doctoral institution: 2014



SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 37, 38, 39, 40.

F

### Median salary of doctorate recipients with definite commitments in the United States, by position type and college generation: 2014



SOURCE: *Doctorate Recipients from U.S. Universities 2014*. Related detailed data: tables 48, 49.



## GLOSSARY

**Basic annual salary.** Annual salary to be earned from the doctorate recipient's principal job in the next year, not including bonuses or additional compensation for summertime teaching or research.

**Definite commitment.** A doctorate recipient who is either returning to predoctoral employment or has signed a contract (or otherwise made a definite commitment) for employment or a postdoc position in the coming year.

**Definite employment commitment.** A doctorate recipient with a definite commitment for employment in a non-postdoc position in the coming year.

**Field of study.** The Survey of Earned Doctorates (SED) collects data on 317 fields of doctoral study. For reporting purposes, these fields are grouped into 35 major fields and are further aggregated into seven broad fields: life sciences, physical sciences, social sciences, engineering, education, humanities, and other non-science and engineering fields. See table A-6 in the technical appendix to this report for a listing of the major fields within each broad field category. See the survey questionnaire for a full listing of the fine fields of study in 2014. (The technical appendix and the survey questionnaire are both available at [www.nsf.gov/statistics/sed/](http://www.nsf.gov/statistics/sed/).)

**First-generation college student.** A college student for whom neither parent earned a bachelor's degree.

**Graduate education-related debt.** The amount of debt owed by a doctorate recipient at the time the doctorate is awarded that is directly related to graduate education.

**Non-S&E.** Non-science and engineering: A grouping of broad fields of study that includes education and humanities.


**Parental educational attainment.** The highest level of education attained by either parent of a doctorate recipient.

**Postdoc position.** A temporary position primarily for gaining additional education and training in research for doctorate recipients.

**Postdoc rate.** The proportion of doctorate recipients who have definite commitments for a postdoc position among all doctorate recipients with definite commitments.

**Race and ethnicity.** Doctorate recipients who report Hispanic or Latino heritage, regardless of racial designation, are counted as Hispanic or Latino, and as of 2013, those who do not answer the Hispanic or Latino ethnicity question are counted as "ethnicity not reported." Respondents who indicate that they are not Hispanic or Latino and indicate a single race are reported in their respective racial groups, except for those indicating Native Hawaiian or Other Pacific Islander, who are included in "other race or race not reported" for confidentiality purposes. Beginning in 2001, respondents who are not Hispanic or Latino and who indicate more than one race are reported in the category "more than one race." Data for this category were not collected before 2001. Before 2001, respondents who are not Hispanic or Latino and who





indicate more than one race were categorized as “other or unknown.” For 2001 and later data, the “other or unknown” category includes doctorate recipients who indicated that they were not Hispanic or Latino and either did not respond to the race item or reported their race as Native Hawaiian and Other Pacific Islander. For 2000 and earlier data, Native Hawaiians and Other Pacific Islanders are counted in the Asian group. For the purposes of this report, the term “underrepresented minority” refers to the American Indian or Alaska Native, black or African American, and Hispanic or Latino groups.

**Research doctorate.** A doctoral degree that is oriented toward preparing students to make original intellectual contributions in a field of study and that is not primarily intended for the practice of a profession. Research doctorates require the completion of a dissertation or equivalent project. In this report, the terms “doctorate” and “doctoral degree” are used to represent any of the research doctoral degrees covered by the survey. Professional doctorates, such as the MD, DDS, JD, and PsyD, are not covered by the SED.

**S&E.** Science and engineering: A grouping of broad fields of study that includes science (life sciences, physical sciences, and social sciences) and engineering fields.

**Second- or later-generation college student.** A college student who had at least one parent with a bachelor’s or higher degree.

**Self-support rate.** The proportion of doctorate recipients who report “own resources” as the primary source of financial support during their doctoral education.

**Sources of financial support.** Sources of financial support are grouped into the following five categories: fellowships (includes scholarships and grants), teaching assistantships, research assistantships (includes traineeships, internships, clinical residencies, and other assistantships), own resources (includes loans, personal savings, personal earnings, and earnings or savings of spouse, partner, or family), and other (includes employer reimbursements and foreign [non-U.S.] support).

**Stay rate.** The proportion of doctorate recipients with temporary visas who have definite commitments for employment or a postdoc position in the coming year and who indicated the location of their commitment is in the United States.

**Time to degree.** The median time elapsed from the start of any graduate school program to completion of the doctoral degree. In addition to this measure, a second measure of time to degree is also reported in the data tables: median time elapsed from completion of the bachelor’s degree to completion of the doctorate.



## DATA SOURCE

**T**he Survey of Earned Doctorates (SED) is the sole data source for *Doctorate Recipients from U.S. Universities: 2014*. The principal elements of the 2014 SED data collection are described below. More detailed information and related technical tables are available in the technical appendix to this report, available online at [www.nsf.gov/statistics/sed/](http://www.nsf.gov/statistics/sed/).

**Survey eligibility.** The SED collects information on research doctorate recipients only. Research doctorates require the completion of a dissertation or equivalent project, are oriented toward preparing students to make original intellectual contributions in a field of study, and are not primarily intended for the practice of a profession. The 2014 SED recognized 18 distinct types of research doctorates. In 2014, 98% of research doctorate recipients earned the PhD.

**Survey universe.** The population eligible for the 2014 survey consisted of all individuals who received a research doctorate from a U.S. academic institution in the 12-month period from 1 July 2013 to 30 June 2014. The total universe consisted of 54,070 persons in 426 institutions that conferred research doctorates in academic year 2014.

**Data collection.** Survey instruments were mailed to institutional coordinators at each doctorate awarding institution. The institutional coordinators distributed the survey forms to individuals receiving a research doctorate, collected the forms, and returned them to the survey contractor for editing and processing. Data were also collected using Web and telephone versions of the survey. Respondents who did not complete critical

survey items were contacted by mail to request response to these items. NORC at the University of Chicago currently conducts the SED under contract to the National Science Foundation.

**Survey response rates.** In 2014, 91% of research doctorate recipients completed the survey instrument. Limited records (field of study, doctoral institution, and sex) are constructed for nonrespondents from administrative records of the university—commencement programs, graduation lists, and other public records—and are included in the reported total of doctorate recipients. Response rates for 2004–14 are provided in the technical appendix ([www.nsf.gov/statistics/sed/](http://www.nsf.gov/statistics/sed/)).

**Time series data changes.** After a multiyear review of Doctor of Education (EdD) degree programs participating in the SED, 143 programs were reclassified from research doctorate to professional doctorate over the 2010–11 period. No additional reclassifications of EdD degree programs are planned. SED data are no longer being collected from graduates earning degrees from the reclassified EdD programs, and this has affected the reporting of the number of doctorates awarded by sex, citizenship, race, and ethnicity. Several figures in this report show a decline in number of degrees awarded from 2009 to 2011 (in particular, see figures 1D and 1F in the “Who earns a U.S. doctorate?” section and figure 2B in the “Which fields attract students?” section). Readers should note that the declines from 2009 to 2010 and from 2010 to 2011 are at least partly attributable to the EdD reclassification.

## FURTHER READING

**F**or an overarching view of long-term trends in U.S. doctoral education, as reflected in the data from the Survey of Earned Doctorates (SED), please see *U.S. Doctorates in the 20th Century* (NSF 06-319, October 2006, <http://www.nsf.gov/statistics/nsf06319/>). Additional context is provided in summary reports for previous years (*Doctorate Recipients from U.S. Universities*), available at [www.nsf.gov/statistics/doctorates/](http://www.nsf.gov/statistics/doctorates/).

Other publications from the National Science Foundation use SED data to report on focused topics. Publications that relate to the topics covered in *Doctorate Recipients from U.S. Universities: 2014* are listed below, by relevant section.

### **Who earns a U.S. doctorate? and Which fields attract students?**

*Women, Minorities, and Persons with Disabilities in Science and Engineering: 2015* (NSF 15-311, January 2015, <http://www.nsf.gov/statistics/2015/nsf15311/>).

*Numbers of Doctorates Awarded in the United States Declined in 2010* (NSF 12-303, November 2011, <http://www.nsf.gov/statistics/infbrief/nsf12303/>).

*Numbers of Doctorates Awarded Continue to Grow in 2009; Indicators of Employment Outcomes Mixed* (NSF 11-305, November 2010, <http://www.nsf.gov/statistics/infbrief/nsf11305/>).

*Interdisciplinary Dissertation Research* (NSF 10-316, March 2010, <http://www.nsf.gov/statistics/infbrief/nsf10316/>).

*Numbers of U.S. Doctorates Awarded Rise for Sixth Year, but Growth Slower* (NSF 10-308, November 2009, <http://www.nsf.gov/statistics/infbrief/nsf10308/>).

### **What influences the path to the doctorate?**

*Baccalaureate Origins of U.S.-trained S&E Doctorate Recipients* (NSF 13-323, April 2013, <https://www.nsf.gov/statistics/infbrief/nsf13323/>).

*Role of HBCUs as Baccalaureate-Origin Institutions of Black S&E Doctorate Recipients* (NSF 08-319, August 2008, <http://www.nsf.gov/statistics/infbrief/nsf08319/>).

*Baccalaureate Origins of S&E Doctorate Recipients* (NSF 08-311, July 2008, <http://www.nsf.gov/statistics/infbrief/nsf08311/>).

*Time to Degree of U.S. Research Doctorate Recipients* (NSF 06-312, March 2006, <http://www.nsf.gov/statistics/infbrief/nsf06312/>).

### **What are the postgraduation trends?**

*Unemployment among Doctoral Scientists and Engineers Remained Below the National Average in 2013* (NSF 14-317, September 2014, <http://www.nsf.gov/statistics/infbrief/nsf14317/>).

*Unemployment among Doctoral Scientists and Engineers Increased but Remained Below the National Average* (NSF 14-310, April 2014, <http://www.nsf.gov/statistics/infbrief/nsf14310/>).

*International Mobility and Employment Characteristics among Recent Recipients of U.S. Doctorates* (NSF 13-300, October 2012, <http://www.nsf.gov/statistics/infbrief/nsf13300/>).

*Emigration of U.S.-Born S&E Doctorate Recipients* (NSF 04-327, June 2004, <http://www.nsf.gov/statistics/infbrief/nsf04327/>).

*Plans for Postdoctoral Research Appointments among Recent U.S. Doctorate Recipients* (NSF 04-308, March 2004, <http://www.nsf.gov/statistics/infbrief/nsf04308/>).

*Interstate Migration Patterns of Recent Science and Engineering Doctorate Recipients* (NSF 02-311, February 2002, <http://www.nsf.gov/statistics/nsf02311/>).



## ONLINE RESOURCES

**A**n interactive version of the printed report and its related resources, described below, are available on the Web at [www.nsf.gov/statistics/sed/](http://www.nsf.gov/statistics/sed/).

**Data tables.** Data on the full range of survey items collected by the 2014 Survey of Earned Doctorates (SED) are presented in 70 detailed statistical tables. Figures in this report reference these related detailed data by table number. The full set of tables is available for download, either as PDF or Excel files.

**Figures.** The figures illustrating each theme are available in a variety of downloadable formats, together with the figure's source data. All formats are available from the "Download" tab associated with each figure.

**Supporting data.** Data supporting each figure in the report is available for download in Excel format.

**Survey questionnaire.** The questionnaire for the 2014 SED is linked to the in the "How Do I..." section of the online report.

**Technical appendix.** The technical notes provide more detail on how the SED collects data on recipients of research doctorates. The appendix includes technical tables that provide such information as the types of research doctoral degrees included in the SED, survey response rates over time, and details on field aggregations.



## ACKNOWLEDGMENTS

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